



Superficial Magnetic Characterization of the Araguainha Impact Structure

Henrique Moreira Santana*, Emilson Pereira Leite.

Abstract

The Araguainha Dome, located on the border between the states of GO and MT, in the Midwest of Brazil, is the largest impact crater in Latin America (diameter ≈ 40 km). Geophysics has important tools for the characterization of this type of structure, and one of these tools is the analysis and interpretation of magnetic susceptibility (MS). This research proposes an MS analysis integrated with other geological and geophysical data. The result of this work is a magnetic map which contribute to the recognition of the impact structure showing the annular distribution of MS values with higher values around the central uplift.

Key words:

Magnetic Susceptibility, Araguainha Dome, Impact Crater.

Introduction

With a diameter of about 40 km, Araguainha is the largest impact structure among the 11 existing craters in South America. This structure is of the complex type, formed by sediments of the Paraná Basin. It is located on the border between Goiás and Mato Grosso, centered at $16^{\circ}47'S$ and $52^{\circ}59'W$. The interior of the structure exposes a central uplift surrounded by an annular basin 5 km wide and two main rings 10-12 and 14-18 km from the center. Typical impact features, such as shatter cones, impact breccias and planar deformation features (PDFs) were found in the structure area, evidencing intense deformation and fusion [1].

The geophysical methods aid in the identification and detailing of surface and subsurface changes caused by meteorite impacts, allowing the characterization of partially or totally eroded and altered impact structures [2]. This way, the characterization by magnetic susceptibility (MS) measurements on the surface contributes to a more complete understanding of the structures and helps in the formulation of subsurface models. Thus, this project aims to complement the geophysical characterization of this important impact crater.

Results and Discussion

The data provided consist of MS values measured at 890 points along a structure with a portable magnetic susceptibility meter model KT-10 produced by Terraplus (Canada). Values range from 0.000667 to 58.36667 ($\times 10^{-3}SI$), with about 59% of the data between 0.027130 and 0.152900 ($\times 10^{-3}SI$). **Chart 1** shows the main parameters obtained from MS.

Chart 1. Data of magnetic susceptibility (MS) ($\times 10^{-3}SI$) of Araguainha Dome.

Unity	Points	MS (min)	MS (max)	MS (mean)
Furnas	90	0.0037	0.9200	0.1296
Pta. Grossa	124	0.0150	58.3667	5.3833
Aquidauana	480	0.0007	7.4100	0.2490
Passa Dois	98	0.0330	14.2667	0.6402
PM Granite	17	0.0500	0.4000	0.1482
WS Granite	53	0.0400	1.4000	0.2101
Pol. Breccia	17	0.0300	1.8000	0.4999

The interpolation of the data was done using the method of Ordinary Kriging in Oasis Montaj (Canada) software. Two different cell sizes, 2500 m (**Figure 1**) and 100 m, were used. Higher values of MS are observed in the region around the central uplift, in the Ponta Grossa formation.

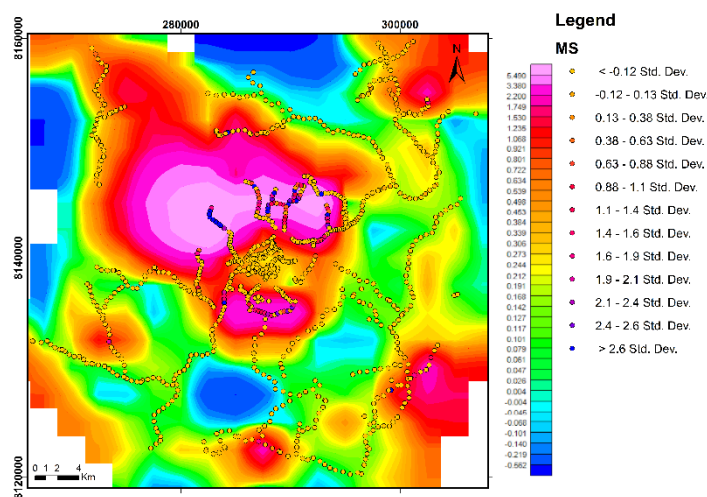


Image 1. Magnetic susceptibility of the Araguainha Dome ($\times 10^{-3}SI$).

Conclusions

The results obtained with the magnetic map allow: the identification of regions with higher magnetism, the association of these regions with the types of rock and shows the morphology and annular arrangement in which the geological units occur in the region. Thus, it is possible to attest to the importance of magnetic data in the characterization of impact structures.

Acknowledgement

The authors are grateful to FAPESP for research funding (2016/16021-5). To CNPq for the provision of the IC financial support. To Geologist Johann Lambert Silva for the provision of geophysical data.

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